

Product Information

Glucose-1-Phosphate (G1P) Colorimetric Assay Kit

Catalog Number **MAK098**

Storage Temperature -20°C

TECHNICAL BULLETIN

Product Description

Glucose-1-phosphate (G1P), also known as the Cori ester due to its discovery by Gerty and Carl Cori, is produced from glycogen during glycogenolysis by the actions of glycogen phosphorylase. Conversion to glucose-6-phosphate (G6P) by phosphoglucomutase allows for entry of the glucose molecule into metabolic pathways such as glycolysis. During glycogenesis, G6P is converted to G1P by the actions of phosphoglucose isomerase.

The G1P Colorimetric Assay kit provides a simple and direct procedure for measuring G1P in a variety of samples. G1P concentration is determined by a coupled enzyme assay, in which G1P is converted to glucose-6-phosphate by phosphoglucomutase in the presence of glucose-1,6-bisphosphate. The glucose-6-phosphate is oxidized by glucose-6-phosphate dehydrogenase to form NADH. The resulting NADH reduces a colorless probe resulting in a colorimetric (450 nm) product proportional to the G1P present.

Components

The kit is sufficient for 100 assays in 96 well plates.

G1P Assay Buffer Catalog Number MAK098A	27 mL
G1P Enzyme Mix Catalog Number MAK098B	1 vL
G1P Developer Catalog Number MAK098C	1 vL
G1P Substrate Mix Catalog Number MAK098D	1 vL
G1P Standard Catalog Number MAK098E	1 vL

Reagents and Equipment Required but Not Provided.

- 96 well flat-bottom plate – It is recommended to use clear plates for colorimetric assays.
- Spectrophotometric multiwell plate reader

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions

Briefly centrifuge vials before opening. Use ultrapure water for the preparation of reagents. To maintain reagent integrity, avoid repeated freeze/thaw cycles.

G1P Assay Buffer – Allow buffer to come to room temperature before use.

G1P Enzyme Mix and G1P Developer – Reconstitute each with 220 μL of G1P Assay Buffer. Mix well by pipetting (don't vortex), then aliquot each and store, protected from light, at -20°C . Use within 2 months of reconstitution and keep cold while in use.

G1P Substrate Mix – Reconstitute with 220 μL of water. Mix well by pipetting, then aliquot and store, protected from light, at -20°C . Use within 2 months of reconstitution.

G1P Standard – Reconstitute with 100 μL of water to generate a 100 mM (100 nmole/ μL) G1P stock solution. Mix well by pipetting, then aliquot and store at -20°C . Use within 2 months of reconstitution.

Storage/Stability

The kit is shipped on wet ice and storage at -20°C , protected from light, is recommended.

Procedure

All samples and standards should be run in duplicate.

G1P Standards for Colorimetric Detection

Dilute 10 μL of the 100 mM G1P Standard solution with 990 μL of water to prepare a 1 mM (1 nmole/ μL) standard solution. Add 0, 2, 4, 6, 8, and 10 μL of the 1 mM standard solution into a 96 well plate, generating 0 (blank), 2, 4, 6, 8, and 10 nmole/well standards. Add G1P Assay Buffer to each well to bring the volume to 50 μL .

Sample Preparation

Tissue (10 mg) or cells (1×10^6) can be homogenized in 200 μL of ice-cold G1P Assay Buffer. Incubate for 10 minutes on ice and then centrifuge the samples at $13,000 \times g$ for 10 minutes to remove insoluble material.

Note: For unknown samples, it is suggested to test several sample dilutions to ensure the readings are within the linear range of the standard curve.

Bring samples to a final volume of 50 μL with G1P Assay Buffer.

Notes: NADH in the samples can generate a background signal. To remove the effect of NADH background, a sample blank may be set up for each sample by omitting the G1P Enzyme Mix from the reaction mix.

Assay Reaction

1. Set up the Reaction Mixes according to the scheme in Table 1. 50 μL of the appropriate Reaction Mix is required for each reaction (well).

Table 1.
Reaction Mixes

Reagent	Samples and Standards	Sample Blank
G1P Assay Buffer	44 μL	46 μL
G1P Enzyme Mix	2 μL	—
G1P Developer	2 μL	2 μL
GIP Substrate Mix	2 μL	2 μL

2. Add 50 μL of the appropriate Reaction Mix to each of the wells. Mix well using a horizontal shaker or by pipetting, and incubate the reaction for 30 minutes at room temperature. Cover the plate and protect from light during the incubation.
3. Measure the absorbance at 450 nm (A_{450}).

Results

Calculations

The background for either assay is the value obtained for the 0 (blank) G1P standard. Correct for the background by subtracting the blank value from all readings. Background values can be significant and must be subtracted from all readings. Use the values obtained from the appropriate G1P standards to plot a standard curve.

Note: A new standard curve must be set up each time the assay is run.

Subtract the sample blank value from the sample reading to obtain the corrected measurement. Using the corrected measurement, the amount of G1P present in the samples may be determined from the standard curve.

Concentration of G1P

$$S_a/S_v = C$$

S_a = Amount of G1P in unknown sample (nmole) from standard curve

S_v = Sample volume (μ L) added to reaction well

C = Concentration of G1P in sample

G1P molecular weight: 260.14 g/mole

Sample Calculation

Amount of G1P (S_a) = 5.84 nmole
(from standard curve)

Sample volume (S_v) = 50 μ L

Concentration of G1P in sample

$$5.84 \text{ nmole}/50 \mu\text{L} = 0.1168 \text{ nmole}/\mu\text{L}$$

$$0.1168 \text{ nmole}/\mu\text{L} \times 260.14 \text{ ng/nmole} = 30.38 \text{ ng}/\mu\text{L}$$

Troubleshooting Guide

Problem	Possible Cause	Suggested Solution
Assay not working	Cold assay buffer	Assay Buffer must be at room temperature
	Omission of step in procedure	Refer and follow Technical Bulletin precisely
	Plate reader at incorrect wavelength	Check filter settings of instrument
	Type of 96 well plate used	For colorimetric assays, use clear plates
Samples with erratic readings	Samples prepared in different buffer	Use the Assay Buffer provided or refer to Technical Bulletin for instructions
	Cell/Tissue culture samples were incompletely homogenized	Repeat the sample homogenization, increasing the length and extent of homogenization step.
	Samples used after multiple freeze-thaw cycles	Aliquot and freeze samples if needed to use multiple times
	Presence of interfering substance in the sample	If possible, dilute sample further
	Use of old or inappropriately stored samples	Use fresh samples and store correctly until use
Lower/higher readings in samples and standards	Improperly thawed components	Thaw all components completely and mix gently before use
	Use of expired kit or improperly stored reagents	Check the expiration date and store the components appropriately
	Allowing the reagents to sit for extended times on ice	Prepare fresh Master Reaction Mix before each use
	Incorrect incubation times or temperatures	Refer to Technical Bulletin and verify correct incubation times and temperatures
	Incorrect volumes used	Use calibrated pipettes and aliquot correctly
Non-linear standard curve	Use of partially thawed components	Thaw and resuspend all components before preparing the reaction mix
	Pipetting errors in preparation of standards	Avoid pipetting small volumes
	Pipetting errors in the Reaction Mix	Prepare a Master Reaction Mix whenever possible
	Air bubbles formed in well	Pipette gently against the wall of the plate well
	Standard stock is at incorrect concentration	Refer to the standard dilution instructions in the Technical Bulletin
	Calculation errors	Recheck calculations after referring to Technical Bulletin
	Substituting reagents from older kits/lots	Use fresh components from the same kit
Unanticipated results	Samples measured at incorrect wavelength	Check the equipment and filter settings
	Samples contain interfering substances	If possible, dilute sample further
	Sample readings above/below the linear range	Concentrate or dilute samples so readings are in the linear range

LS,MAM 02/13-1